

GUIDELINE	PERFORMANCE	EXCEPTIONS & DEVIATIONS
<p>1. Components Requiring Independent Verification</p> <p>Components that ensure safe and reliable operation, as determined by safety analysis, should receive independent analysis in accordance with the following requirements:</p> <p>a. Safety-Related Systems  Not required if:</p> <ul style="list-style-type: none"> <li>• Mispositioning would not affect the system performance</li> <li>• Mispositioning would be immediately known to operator</li> <li>• Independent verification would involve significant radiation exposure</li> </ul>	<p>1. Components Requiring Independent Verification</p> <p>Safety significant structures, systems and components at the accelerator complex include:</p> <ul style="list-style-type: none"> <li>• Relay based access control system</li> <li>• PLC based access control system (PASS)</li> <li>• Radiation shielding and beam dumps</li> <li>• Radiation monitor system</li> <li>• Fire suppression and alarm systems</li> <li>• Kirk Key systems for electrical safety</li> <li>• Oxygen monitors at TVDG</li> <li>• Hydrogen and flammable gas monitoring systems</li> </ul> <p>a. The access control systems have dual, independent and fail safe "critical" devices that are used to block beams or switch beams. Mispositioning of these critical devices would affect performance, and in some cases would not be immediately detected by an operator. Independent functional verification of these systems is performed in accord with the RadCon Manual. Shielding and beam dumps are independently verified by fault studies. See <a href="#">OPM 9.1.9</a>. The radiation monitor system is independently verified by the RCD FS Group and the Beam Components and Instrumentation Group prior to each running period see <a href="#">OPM 8.15.4</a>, "Procedure For a Functional Test of the Chipmunk Computer Interface." At the TVDG, see <a href="#">TVDG RADSAFE System Semi-Annual Test</a>. Fire Alarm Technicians in the Plant Engineering Division independently verify the fire suppression/alarm systems. The Kirk Key systems are installed and tested under the purview of the Chief Electrical Engineer. See <a href="#">OPM 1.5.2</a>. Oxygen monitors at TVDG are verified every 4 weeks. See <a href="#">TVDG OPM 10056</a>. Hydrogen gas monitoring systems are checked each shift by the AGS Watch during operations, see <a href="#">OPM 8.12.3</a>, "Introduction of Explosive Gas Into the Experimental Area." Explosive and flammable gases are removed from the experimental floor during extended maintenance periods.</p>	<p>1. Components Requiring Independent Verification</p> <ul style="list-style-type: none"> <li>• None.</li> </ul>

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<p>b. Non-Safety Related Systems  Independent verification would be appropriate if mispositioning could lead to unplanned shutdowns, challenges to safety systems, or cause the release of radioactive or hazardous material.</p>	<p>b. Non-safety related systems include:</p> <ul style="list-style-type: none"> <li>• RF system</li> <li>• Magnets</li> <li>• Power Supplies</li> <li>• Vacuum System</li> <li>• Beam Instrumentation</li> <li>• Cooling Systems</li> <li>• Compressed Air Systems</li> <li>• Cranes</li> </ul> <p>Operators or systems specialists verify the position of non-safety-related systems during running periods. The Mechanical Services Group monitors cooling systems and compressed air systems. Mispositioning of cooling systems could lead to unplanned shutdowns, or cause the release of water from locations for which the CAD has no release permit. While not safety related, un-permitted releases are serious due to environmental concerns associated with a sole-source aquifer that lies beneath the BNL site. Water mats are used, and cooling system pressures are monitored and alarmed. Response to alarms for tritiated water leaks is covered by procedure <a href="#">OPM 10.2</a>.</p>	
<p>2. Occasions Requiring Independent Verification</p> <ul style="list-style-type: none"> <li>• Returning equipment to service after maintenance.</li> <li>• Removing equipment from service.</li> <li>• Periodic checks during normal operation</li> </ul>	<p>2. Occasions Requiring Independent Verification</p> <ul style="list-style-type: none"> <li>• Equipment startup procedures cover check out or start up of systems. See <a href="#">OPM Chapter 5</a>, "Equipment Startup Procedures." New equipment is verified for service via <a href="#">OPM 2.27</a>.</li> <li>• Equipment shutdown procedures include for example <a href="#">OPM 8.12.6</a>, "EAG Standard Operating Procedure, Securing EAG During AGS Shutdown." and <a href="#">OPM 5.29</a>, "AGS Ring Shutdown."</li> <li>• Periodic checks during normal operations are made by the CAS Watch personnel in experimental areas or by the Radiological Control Technicians for the accelerators and experimental areas.</li> </ul>	<p>2. Occasions Requiring Independent Verification</p> <ul style="list-style-type: none"> <li>• None.</li> </ul>

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<p>3. Verification Techniques - General Guidelines</p> <p>a. Independence Should be conducted in a manner to identify the component, its required position and actual position.</p> <p>b. Remote Position Indicators Perform check local to the device, unless precluded by ALARA.</p> <p>c. Process Parameters Should not be used as the only indication of a components' position. A review should be made to determine when these parameters would be acceptable.</p> <p>d. Throttled Valves Position indicators should be used in conjunction with observing the actions of valve actuator to proper verification.</p> <p>e. Surveillance Testing Independent verification should be used only when proven to satisfy independent verification requirements.</p> <p>f. Operation Self-Appraisal and Verification Should be performed periodically to ensure that the ES&amp;H considerations, and operations functions are being conducted in accordance with established criteria.</p>	<p>3. Verification Techniques - General Guidelines</p> <p>a. Specific examples of independent verification techniques may be found throughout the OPM. For example, see procedures <a href="#">OPM 2.6.1</a> that require a Safety Watch Verifier.</p> <p>b. Position indicators are checked local to the device. For example, access control gates are reset locally.</p> <p>c. Process parameters, such as radiation monitor set points, are reviewed by the Radiation Safety Committee to determine acceptable set points (see <a href="#">OPM 8.15.3</a>).</p> <p>d. Not applicable to accelerators.</p> <p>e. Not applicable to accelerators.</p> <p>f. Operation self-appraisal and verification are performed periodically to ensure that the ES&amp;H considerations, and operations functions are being conducted in accordance with established criteria. See <a href="#">OPM 9.4.2</a>, "CAD Self Assessment," and <a href="#">OPM 3.10.1</a> Independent Assessment."</p>	<p>4. Verification Techniques - General Guidelines</p> <ul style="list-style-type: none"> <li>None</li> </ul>